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AUTHOR Barker, Bruce O.
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ABSTRACT

The meteoric rise of the computer age is a challenge for public educators, many of whom are still unfamiliar with basic computer technology. Yet many educators are finding that they can correct their misconceptions about computers by becoming "computer aware." Computer awareness comes from gaining a knowledge of computer history; a basic understanding of how computers work; an awareness of the different types of computers, their peripheral hardware, and their software; an understanding of computer capabilities and limitations; and some experience in using a computer. For computer awareness to be a reality for educators, computers must be available in schools. However, a 1982 survey shows that only 58% of all public school districts have computers. Also, according to a 1983 study, only 60% of rural school districts with a maximum of 900 students offer computer science in the secondary curriculum. In addition to using computers for instruction, schools can use computers for calculations, recordkeeping, word processing, control, simulation and gaming, and creative arts. A glossary of 90 computer terms and a microcomputer resource guide listing organizations, books, booklets, periodicals, articles, and other documents published since 1979 are included. (SB)

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COMPUTER AWARENESS FOR RURAL EDUCATORS

Paper Prepared for
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COMPUTER AWARENESS FOR RURAL EDUCATORS

by

Bruce O. Barker

As a society, we have now entered a technological era where information is the power source. The capabilities of the microcomputer have made this abundance of information available to anyone who is able to access it. Computer instruction programs and computer literacy programs have been incorporated into the curriculum of many schools and will undoubtedly be included in many more. The National Commission on Excellence in Education recommended, in early May of this year, that all secondary students be required to complete at least one-half year of computer science before graduating from high school. Very few educators today would maintain the view that computers are just another fad that will wind up on the shelf as so many previous innovations have done. Nevertheless, a large number of educators in our public schools still find themselves unfamiliar with basic computer technology and are perplexed when asked to teach computer concepts to their students.

The computer age seems to have advanced so suddenly upon us that many educators have been caught unaware. Most of those, now teaching, graduated from college before the advent of the silicon chip and were not exposed to computers while pursuing their degrees. Even 30 years ago, the word "computer" did not appear in most dictionaries. In fact, if automobile transportation had advanced at the same rate as the computer industry has over the past 30 years, cars would now travel at speeds of four billion miles per hour and a person could travel direct from Salt Lake City to Tokyo in seven seconds at a cost

of less than 25 cents (Carlson, 1980).

The challenge facing public educators, as a result of the computer revolution, has been cited by Arthur Luehrman, computer research director at the Lawrence Hall of Science, University of California, who declared ". . . we will need 40 million persons able to use computers by 1990, and I don't know who is going to teach them" (Houston Post, 1980).

Each year there are fewer teachers who are frightened by computers. As more educators begin to work with computers and learn to use them, they begin to reduce the "magic box" perception that some people have about computers. Actually, computers can be defined as very simple tools -- they only accept on/off signals. Such signals are converted into either words or numbers. Computers are able to count these signals, perform mathematical operations on them, store the results, recall results as needed or wanted, and move the results around. With appropriate "peripherals," computers are able to display these results on a video screen in either text or graphic form, print the results on a piece of paper, draw a complex picture, or transmit results to other machines by electronic signals. The work which computers perform is done extremely well and at speeds which are incomprehensible. For example, "supercomputers," which have recently been developed and are now available on the market, can perform 200 million calculations per second (Magarrell, 1983).

The impact of computers on society has been, and will continue to be, revolutionary. Many sociologists assert that we are now moving from an industrial age to an information age. It is imperative that public educators become "computer aware" and, if possible, "computer

literate" in order to help prepare and train the millions of tomorrow's workers who will live in a universe of technology. Although some confusion exists among experts as to what constitutes computer awareness and computer literacy, it is generally agreed that computer awareness includes a knowledge of computer history; a basic understanding of how computers work; an awareness of different types of computers, peripheral hardware that go with them, and software programs which are available for use; capabilities and limitations of computers, and a knowledge of how to retrieve information from a computer and actually use the machine. Computer literacy would include all of this, plus proficiency in programming (Bell, 1983). Nevertheless, it should be understood that in order to benefit from using a computer, one need not be a skilled programmer. There has traditionally been a greater need in our society for tool users rather than tool makers. For example, it is important that we have people in our society who know how to build and repair an internal combustion engine. However, neither that knowledge nor skill is needed for an individual to operate and benefit from the mobility provided by the modern day automobile. The same is true in relation to computers. It is definitely beneficial to know how to program, but it is not a required prerequisite to operating and accessing information from a computer. More and more software programs are now being developed which are described as being "user friendly" -- that is, they have been intentionally designed for effective use by the lay person.

Of course, for most teachers and administrators, the emphasis is for computer awareness. Without doubt, we need computer literacy -- people who know how to program the "things" and make them work, but

for most people the challenge is to become acquainted with computers and to learn how to manipulate and control them. In order to do so, computers must be made available for educators to acquire hands-on exposure and practice. Yet a 1982 national survey, conducted to determine the number of school districts which have computers, showed that of 15,314 public school districts, only 8,947 (58 percent) had a computer(s) (Sanford, 1982). These findings included both urban and rural districts. The exact number of rural districts which have access to a computer or computers is not known. However, a nationwide study of K-12 rural school districts of 900 students or less conducted by Smith, Muse, and Barker (1983) reported that computer science, as a subject, was included as a part of the secondary curriculum in 60 percent of the districts surveyed. Without question, the financial wealth of each district will be a key factor in determining how quickly computers are added as a part of the instructional program.

The application of the computer for school use can be seen in terms of making calculations, recordkeeping, word processing, simulations and gaming, control, instruction, and creative arts. In regards to calculations, computers are wonderful machines for managing the school budget. They are able to manipulate figures -- without errors, at high speeds, over and over again. For recordkeeping, they are able to store, retrieve, sort and otherwise keep track of literally millions of things ranging from library books, to inventories of parts, people, places, etc. The ability of computers to maintain large "data banks" is beyond comprehension. As a word processing tool, they make typewriters appear obsolete. Return keys

no longer have to be punched at the end of each line; words, phrases, and entire pages can be moved or deleted with ease; entire documents can even be checked for correct spelling in a matter of seconds. The enormous popularity of video games is indicative of the potential computers have for simulation and gaming. The computer can manipulate little red and blue beings or figures on a video screen in so many intriguing ways that it almost seems possible to entertain our entire adolescent population. Our national economy can be simulated, the flight of a large commercial jet, or the surgical procedure of a delicate operation. As a control device, computers are able to control thermostats, light fixtures, elevators, etc., and they can do it rapidly, and repetitiously without complaints. In relation to instructional use, when properly programmed, they are able to diagnose a learner's skills, present the information needed for drill and review, periodically check progress, slow the student down or speed the individual up, correct the student's work, evaluate the results, and even praise the student. Finally, in regards to creative arts, the proper manipulation of computers enable them to compose music, draw, paint, or otherwise create. Naturally, many people will be needed to design, build, and program computers to perform these tasks. But having people able to manipulate and use computers and computer software for such purposes is at the heart of computer awareness.

What can be done for those teachers and administrators who need to become "computer aware" and have not yet done so? The attached Appendix contains a glossary of computer terms intended to help familiarize an individual with common computer terminology. Also, a Microcomputer Resource Guide is attached which lists books,

periodicals, organizations, etc. where one can obtain information on computers and their applications for use in education. Both lists have been made available by personnel at the Mid-continent Regional Education Laboratory and have been reproduced with permission. Reading and studying about computers will definitely help one become more aware of their functions and uses. Nonetheless, if one is to become an effective tool user, then that individual must sit down at a terminal and actually begin to use the machine. No one ever became skilled in using a hammer simply by reading about hammers, looking at a hammer, or watching someone else use a hammer. Application and practice are essential in order to develop any skill. The same principle applies to computers as well. Learning to use the computer as a tool comes only through hands-on practice, and continued practice will bring increased confidence in using the new technology.

BIBLIOGRAPHY

Bell, Fredrick H. "Implementing Instructional Computing and Computer Literacy," On Line (South-Western Publishing Company). Spring, 1983, volume 1, number 2, pp. 9-11.

Carlson, Gary. Interview held during Continuing Education Seminar "Technology and Education," Brigham Young University, Provo, Utah. October 12, 1980.

"Computer Illiteracy Cited as Future Problem," Houston Post, September 21, 1980.

Magarrell, Jack. "Dearth of New 'Supercomputers' Called Threat to U.S. Leadership in Science and Technology," Chronicle of Higher Education, March 30, 1983, pp. 8-10.

Sanford, Sharon. "News Flash: Survey Finds 24,642 Schools with Computers, Up 56% in Last Year." School Improvement and Technology (Mid-continent Regional Educational Laboratory) Winter, 1982, p. 13.

Smith, Ralph, Ivan Muse and Bruce Barker. "A Study of Rural School Districts in the United States and Implications for Teacher Education." Paper presented at American Education Research Association. Montreal, Canada, April 11-15, 1983.

APPENDIX

Glossary of Computer Terms

Compiled by Sandra Richardson

Taken from School Improvement and Technology
Mid-Continent Regional Educational Laboratory
Winter, 1982. Used with permission.

It is our intention that this glossary will familiarize you with many terms you are likely to encounter when dealing with computer technology.

Access Time — The time it takes the computer to access needed data. Today's computers can access data from storage very quickly — particularly from magnetic disks; access time for magnetic tape is somewhat longer.

Address — A numerical reference to the location in the computer's memory where an item exists.

ADP — An acronym for Automatic Data Processing, referring to the manipulation of data by a computer.

Algorithm — A set of rules for the solution of a problem as defined in a finite number of steps. A recipe in a cookbook and a geometrical proof are examples of non-computer algorithms.

ANSI — An acronym for the American National Standards Institute. This institute studies codes and computer languages, and makes recommendations that will lead to greater computer uniformity.

Analog Computer — Today's computers are mainly digital computers, which make calculations by counting. Analog computers make calculations by representing numbers in measurable physical quantities such as light, heat, or pressure. A voltage meter is an example of an analog computer.

Application Program — A program used to solve a certain type of problem or to do a specific job. A program designed to keep track of student records would be an application program.

Artificial Intelligence — A mechanical device or software system has artificial intelligence if it can perform functions that require learning or reasoning, or would be considered to be intelligent if performed by a human being. One example is a chess-playing program.

ASCII — Acronym for the American Standard Code for Information Interchange. It is the binary code used by most computers and terminals (except IBM). The code represents upper and lower case letters, numbers, symbols, and punctuation marks.

Assembly Language — A computer language intermediate between machine language and compiler languages. These languages use symbols to represent machine language instructions. Assembly languages are usually computer-specific: they are closely related to machine language and the internal hardware design of the computers; for this reason, assembly languages are considered low-level languages. Programs written in assembly language are usually very efficient in the use of main storage and time.

Baud — A term used in describing data transmission rate from a computer to another device or vice versa; usually one bit per second.

Binary — The number system that computers use because it only has two digits, 1 and 0, and the electronic circuits can only be "on" or "off." Series of zeroes and ones are used to represent data.

Bit — (Binary digit) This is the basic unit for storing data in the computer's main storage. Each bit is either "on" or "off;" the computer designers assigned codes for the various combinations of "off" and "on" bits to represent characters. In most computers eight bits are required to store a letter of the alphabet, a number, or a special character.

Block — Sections of information recorded on disks or magnetic tape are called blocks. A block may contain several records — collections of information composed of one or more related items, or a record may spread over several blocks.

Boot — The process of loading the operating system of the computer into main memory and beginning operation.

Branch — A branch provides a way of departing from the regular sequence of program instructions. The departure follows a "branching instruction" in the program and may be dependent on conditions specified in the program.

Bubble Sort — A sorting algorithm for putting the elements of a file in order. It works by taking an element, e.g. element B, comparing it with another (say the first element on the list), and then exchanging them if it is appropriate for Element B to head up the list, and so on, until all the elements are in the order the user desires.

Buffer — A place in the computer system where information may be stored temporarily, for example, until the computer is ready to process that information.

Bug — A bug is an error in a program that keeps it from working properly. Bugs may also be present in the computer hardware.

Byte — A piece of information in the computer's main storage that is 8 bits long. One byte can store one character.

CAI — Computer Aided Instruction —This is one way the computer is used as a teaching tool. The computer acts as a tutor and leads the student through subject material, asking questions and moving ahead or back over the completed material depending on the student's answers. It is most often used to drill students in areas like math, spelling, or foreign languages.

CMI — Computer Managed Instruction involves the use of a computer system to handle testing, evaluation, and pre-

scription of instructional activities.

Characters — Symbols: either digits, spaces, punctuation marks, or letters of the alphabet which are expressed as a small group of bits to the computer.

Chip — An integrated circuit contained on a piece of silicon, often no larger than a thumbnail. In computers, this is usually called the microprocessor, and it contains the CPU and main storage memory.

Code — A code can be either the lines of instructions making up a computer program or the method of representing symbols in binary bits.

Compiler or High Level Languages — The program statements used by high-level programming languages are not closely related to the computer's inner structure. One high-level program statement corresponds to several machine language program statements; high-level languages are easier to use for this reason, but their programs are less powerful and efficient than those written in machine or assembly language. Examples of high-level languages include BASIC (Beginners All-purpose Symbolic Interaction Code), Pascal (named after mathematician Blaise Pascal, who developed one of the earliest calculating machines), and Logo.

Computer — A machine that performs operations on data stored in its memory according to a program of instructions stored in its memory. It can manipulate large amounts of data very rapidly. Computers come in a variety of shapes and sizes appropriate for different applications.

Core Memory — The term many people still use when referring the to main memory of the computer. Originally, cores were tiny doughnuts of magnetic material which were each capable of storing one bit. However, today the cores have been largely replaced by semi-conductors.

Courseware — The programs that turn the computer into a teaching machine are called courseware. They are usually predesigned, off-the-shelf packaged courses based on general subject areas.

Cursor — The cursor is the indicator (often flashing) that appears on a computer's CRT monitor showing where the next character will go. The cursor lets you know where you are on the computer screen.

DOS — The acronym for Disk Operating System. A computer system that allows for interaction between disks and the microcomputer by using disk drives.

Data — Data is the formalized representation of information: facts, concepts, or instructions; for communication, interpretation, and processing by machines or humans.

Data Link — Data links provide the means for the rapid transfer of data from one place to another. Examples of data links are telephone lines and radio links. Infra-red light beams and laser beams may also be used as data links.

Data Structure — This refers to the decision on how data are to be organized in and retrieved from the computer memory. Examples of some data structures are lists, files, arrays, and stocks.

Debugging — Debugging is the process of finding and correcting errors in a program. It is an essential programming step, because a faulty program will not run.

Digital — Electronic circuits that are digital have only two positions, "on" or "off" — the signal is either absent or present. These circuits are simple and therefore easy to use in large numbers — as in computer main storage.

Digital Computer — A device for doing calculations that works by counting as opposed to making measurements as an analog computer does.

Disk — A storage device made of a thin disk made of or coated with magnetic material. Disks are covered with tracks like those on a phonograph record and can store a large amount of information.

Disk Drive — A disk drive is a device that provides a way for the computer to retrieve and store data on disks. The disk drive spins the disks and moves read/write heads, which store or retrieve data, into position when needed.

Documentation — This is the final step a programmer must make when the program is complete. Documentation of the working program includes the program's name, its purpose, its input and output requirements, flow charts, program listings, sample computer output, written instructions, etc. Documentation is necessary if the programmer wants to use or change the program again or if someone else will be using it.

Editor — A type of program that allows the user to modify statements of other programs.

File — A unit of records. Each record corresponds to a number in the file.

Floppy Disk — A type of disk commonly referred to as a diskette. Developed for small computers as an efficient way of storing information.

Flow Chart — A visually effective way of diagramming programs. Rectangular, triangular, or circular shapes each signifying a particular computer operation or step in the program are connected by lines, showing the progression of control throughout the program.

GIGO — This stands for "Garbage in, Garbage out." It serves to remind us that programs are only as good as those who write and use them.

Hard Calculation — Performed manually by the programmer using a calculator to double-check the accuracy of the program.

Hardware — The physical machinery. The main components of the computer are input units such as the keyboard, primary storage, central processing unit, secondary storage, and output units such as a printer.

I/O — Input/Output — Basic data processing operations that require the reading of data and the production of some kind of output from that data are classified I/O.

Interface — A device that serves to interpret the signals from one machine to another so they can work together. A modem that allows data to be transmitted over telephone lines is a type of interface.

Integrated Circuit — (IC) A tiny silicon chip that has thousands of interconnected transistors etched on its surface is an integrated circuit. A microprocessor or the central processing unit of a microcomputer is an example of an integrated circuit.

Intelligent Terminal — A terminal that is capable of doing more than just transmitting or receiving data because it contains a microprocessor.

Interactive — Analogous to "conversational." An interactive program will present questions for the user on the screen and then perform based upon the user's answers. This communication usually takes place by means of a typewriter keyboard terminal.

K — The symbol "K" denotes a little over 1000 of something. One K = 1024.

Label — Labels are numbers or letters the programmer assigns to statements in a program so that the computer can locate them for later use.

Line Printer — A high speed printer connected to a computer that can print out data whole lines at a time.

Linear — A straight line. Linear functions resemble straight lines when graphed, usually composed of horizontal character strings.

List — A type of data structure. Each list item is referenced to other related items of information. The relationships between items on a list are generally more complex than what we ordinarily think of as a list.

Log On — The process of identifying yourself to the computer so that you can use the system. A user usually will have a code (letters or numbers) that will activate the system.

Loop — A programming technique used to repeat a series of instructions over and over.

Machine Language — Machine language is the strings of binary numbers the computer directly understands. It is the lowest level programming language.

Magnetic Tape — Very similar to tape used in a conventional tape recorder, magnetic tape may be used to store large amounts of information.

Main Frame — The part of the computer where the CPU is and main memory systems are stored. The CPU contains, the registers, arithmetic circuitry, and everything else that does the computing. Main frame also refers to a large computer system to which many mini-and microcomputers are terminated.

Microcomputer — Refers to the hardware composed of read-only memory (ROM), random access memory (RAM) input, output, microprocessor, etc.

Microprocessor — The small silicon chip imprinted with the entire CPU and main memory system of a microcomputer.

Modem — Abbreviated form of "Modulator-Demodulator." A modem converts the computer's digital signals into analog signals (Beeps or chirps) that can be sent over telephone lines.

Monitor — The television type screen attached to computer terminals or microcomputers and used to help observe and operate the computer's programs.

Number Crunching — Long or complicated computations.

Off Line — Equipment or data that are not directly accessible by the computer. For example, data stored on magnetic tape must be loaded into on-line storage before the computer can process it.

On Line — Any piece of equipment that sends information directly to the computer to be processed immediately.

Operating System — The operating system is a system of programs that allows the computer to work on various tasks for long periods of time without direct intervention of the operator. It also insures the proper functioning of many of the computer's programs.

Peripheral — A peripheral is a device that may be connected to the computer to perform an activity not directly involved with the computer's primary functions. Printers and disk drives are examples of peripherals.

Plotter — An output device designed to move a pen in two directions over paper to draw pictures. It is sometimes referred to as an x-y plotter.

Port — An input or output connection to the computer. (For example, printers and plotters are connected to ports.)

Program — A set of instructions which direct the computer to do a certain task. Programs may be written in a variety of languages for different applications.

RAM — Random Access Memory — The main memory or storage is Random Access Memory. Information may be read or retrieved from RAM at any time, rather than having to wait for the tape or disk to be in the right position. Information may be changed by writing a new operation; however, the contents are usually lost when the machine is turned off.

Records — Records consist of related items of information grouped together.

Remote — Refers to equipment that is generally located at a distance but is used via telephone lines or other data links.

ROM — Read Only Memory. ROM contains permanently stored programs, usually monitors and I/O drivers. The information planted in ROM cannot be removed or destroyed. ROM is commonly referred to as Firmware.

RS-232 — An industry-wide standard for serial data transmission between computers and peripherals.

Sector — The wedge-shaped segments of magnetic tape used for addressing information.

Serial — A serial process is one where data are transmitted one bit at a time.

Simulation — A computer program which models some system, typically using mathematical techniques.

Software — The term used to refer to a computer's programs, but also can refer to everything that is not equipment.

Sort — A process to arrange previously random elements into some kind of orderly sequence.

String — A line of symbols (usually ASCII characters) that are treated as one unit for I/O operations and other program manipulations. ("character strings," "text strings," "string manipulations," etc.)

Systems Program — The systems program controls the operations of the computer.

Terminal — A device designed to communicate with the computer, usually by means of a keyboard. It can also be an I/O device linked directly to the computer by data links.

Text Editor — Usually incorporated in word processing machines or programs, a text editor enables the user to manipulate text by adding or deleting words, transposing sentences, correcting spelling and so on.

Video Graphic Display — Video graphic display enables the computer to draw pictures on the monitor screen in black and white or color, and with some systems even in three dimensions.

Word Processing — The use of a computer as an automated typewriter. Entire drafts of documents are sorted in a computer memory and can be edited or modified, and then printed out error-free. ■

Taken from School Improvement and Technology
The Mid-Continent Regional Educational Laboratory
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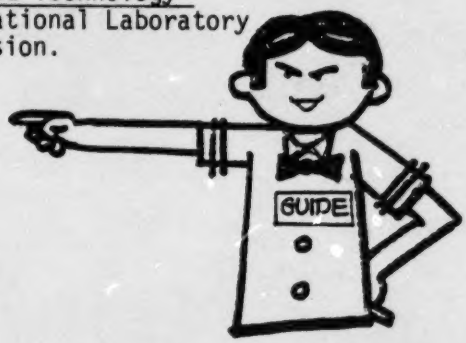


Microcomputer Resource Guide

Compiled by Sandra Richardson

The following descriptive list of microcomputer resources is designed to serve as a guide to some introductory materials on the various aspects of microcomputer use, specifically in education. Included are books, booklets, periodicals, magazine articles, documents, and organizations.

Books, Booklets

Association for Educational Communications and Technology. (AECT). **Guide To Microcomputers.** 1980. 150p. Available from: AECT, Publications and Sales, 1126 16th St. N.W., Washington, DC 20036. $11.25 plus $2.00 postage and handling.

Types of equipment, manufacturers, different programs, and program applications are explained by this book in the language of the lay person. This book provides an overview and an inside look at microcomputers, and features an extensive resource list including a bibliography of journals and magazines, a list of software, and a list of companies specializing in the preparation of educational programs.

Bork, A. **Learning With Computers.** 1981. 304p. Available from: Digital Press, Educational Services Order Fulfillment, Digital Equipment Corporation, 12-A Esquire Road, Billerica, MA 08162. $25.00. When ordering include order number—EY AX014 DP.

This collection of articles is written in a non-technical style and offers a comprehensive overview of the use of computers as interactive teaching and learning devices. Topics covered include computer graphics for learning, online tests and quizzes, motivation for computers in the classroom, course management, hardware and software, personal computers versus time-sharing systems, attitudes toward simulations, and computers versus television.

Dertouzos, Michael and Moses, Joel, eds. **The Computer Age: A 20-Year View.** 1979. 490p. Available from: MIT Press, Cambridge, MA. $25.00

Presenting the predictive insights of some of the most honored veterans in the computer field, this book focuses on topics expected to be important in the next 20 years. Topics addressed are: impacts of cost reduction on communications, individuals and organizations, future trends of the computer, and socioeconomic views of the computer.

Doerr, C. **Microcomputers and the 3 R's: A Guide For Teachers.** 1979. 177p. Available from: Hayden Book Company, Inc., Rochelle Park, New Jersey. $9.75

This book is designed for use as an individual reference or as a text for an introductory microcomputer course for teachers and prospective teachers. The book consists of three main sections. Section I contains an overview of microcomputers and describes the benefits of using computers in the classroom. Section II provides an overview of the spectrum of educational computer use, with a chapter on each of the major types of instructional application. Section III serves as a reference listing instructional and computing resources, and provides information on the availability, advantages and disadvantages of the computer products on today's market.

Heck, W., Johnson, J., Kansky, R. **Guidelines for Evaluating Computerized Instructional Materials.** 1981. 26p. Available from: National Council of Teachers of Mathematics, 1960 Association Drive, Reston, VA 22091. $3.95.

Written for educators who need to review educational software for possible purchase and use in the classroom, this booklet includes a sample software evaluation checklist and documentation sheets. In addition to guiding the reader, step-by-step, through the evaluation process, it offers a list of resources for further information.

Microcomputer Directory: Applications in Educational Settings. Second Edition, 1982. Compiled by staff of the Monroe C. Gutman Library, Harvard University Graduate School of Education. Available from: Gutman Library, Harvard University Graduate School of Education, Appian Way, Cambridge, MA 02138. $15.00 plus $1.00 postage for prepaid orders, $2.50 for purchase orders.

This directory provides information about the way schools all over the United States are using microcomputers. Each listing includes the scope of microcomputer use, types of computers and software used, sources of funding, and a contact person. The 900 entries represent almost 1200 individual schools, more than 1000 teachers, principals, media specialists, and parent and student leaders.

Morsund, D. **Pre-College Computer Literacy: A Personal Computing Approach.** 1981. 28p. Available from: International Council for Computers in Education, Dept. of Computer and Information Science, University of Oregon, Eugene, OR 97403. $2.50.

This booklet examines personal computing and the aspects

of computers that can have a direct impact on students. The booklet is intended for curriculum specialists, elementary and secondary teachers, media specialists, etc. Topics range from historical overviews of computer technology, education, and literacy, to the ways students can use personal computing to help themselves become computer literate.

Morsund, D. **School Administrator's Introduction to Instructional Use of Computers.** 1980. 48p. Available from: International Council for Computers in Education, Dept. of Computer and Information Science, University of Oregon, Eugene, OR 97403. $2.50.

This booklet gives an overview of the field of computers in education, with special emphasis on instructional uses of the computer. It is organized as a sequence of questions and answers, with a set of goals and proposed actions along with a discussion of the cost of achieving those goals. This booklet has two purposes: 1) to acquaint educational policy makers with some of the current roles and potential applications of computers in the curriculum and 2) to encourage educational policy makers to initiate actions that will lead to proper and effective instructional use of computers in their school system. Also included in this booklet is a brief glossary of frequently used computer terms, and a brief guide to periodical literature.

Papert, S. **Mindstorms: Children, Computers, and Powerful Ideas.** 1980. 230p. Available from: Basic Books, Inc., New York, NY. $6.95.

This book deals with how computers may affect the way people think and learn — ways in which computer presence could contribute to mental processes instrumentally and conceptionally. Computers can be carriers of powerful ideas, cultural "germs" or "seeds." Papert deals with specifics about what kind of nurturance is needed for inteilectual growth and about what can be done to create such nurturance in the home as well as in the wider social context. He believes that certain uses of very powerful computational ideas can provide children with new possibilities for learning, thinking, and growing emotionally as well as cognitively. *Mindstorms* introduces the computer language LOGO and explores its implications in using computers to teach children.

Taylor, R., ed. **The Computer In The School: Tutor, Tool, Tutee.** 1980. Available from: Teachers College Press, N.Y., NY. $14.95 paper.

Nineteen essays by five pioneers in the field of computers in education are presented in this volume. The essays provide a foundation for understanding the basic issues involved in using computers in schools, the teacher's role in helping the student make full use of computing, and the general limitations of computer use. Among the topics addressed are interactive learning, heuristic strategies, teaching children to think, mathematics education, and the future of computers in education.

Periodicals

Classroom Computer News. Intentional Educations, Inc., 341 Mt. Auburn St., Watertown, MA 02172. Published six times yearly — $16.00. (617) 923-8595.

Classroom Computer News is a magazine about educational computing geared for parents and teachers. It features news items — how computers are currently used in education, editorials, profiles of major figures in educational computing, articles by teachers and parents, software reviews, information on new products, and a calendar of upcoming events. *Classroom Computer News* is written in a direct, easily understandable style; it is a valuable resource for educators and parents who want to keep up with the field of educational computing.

Creative Computing. P.O. Box 13010, Philadelphia, PA 19101. Published monthly — 12 issues $24.97. (800) 631-8112.

Advertised as the "Number one magazine of computer applications and software," this is a highly polished magazine for the computer literate public. It features evaluations, profiles, and articles on innovations in the computer industry, as well as information concerning computer applications and current software. *Creative Computing's* departments include: "Input, Output" or letters to the editor; "Notices," which announce upcoming contest, competitions, and conferences; "New Products"; "The Other Side," which focuses on foreign innovations; "Book Reviews"; and an "Index to Advertisers."

The Computing Teacher. The International Council for Computers in Education, Dept. 4A, Department of Computer and Information Science, University of Oregon, Eugene, OR 97403. Published monthly — 12 issues $16.50. (503) 686-4414.

The Computing Teacher is a journal for educators who are making instructional use of computers or who are concerned with how computers are affecting the content and process of education. Each issue contains information of use to both the computer beginner and the experienced computer user. Topics covered include: teaching with computers, teaching about computers at all grade levels, and use of computers as an aid to problem solving in all disciplines, and teacher education.

Electronic Learning. Scholastic, Inc., P.O. Box 2580, Clinton, IA 52735. Published monthly — 8 issues $15.00.

Electronic Learning is a monthly publication aimed specifically at the educator. This magazine features timely information concerning hardware and software selection, computer curriculum development, suggestions for implementation on the administrative and classroom levels, plus current resources, references and articles to help educators teach as well as become computer literate.

Educational Technology. Educational Technology Publications, 140 Sylvan Avenue, Englewood Cliffs, NJ 07632. Published monthly — 12 issues $49.00. (201) 871-4007.

This excellent publication provides educators with current information and in-depth discussion on all aspects of educational technology. Monthly features included in the magazine's contents are: Computer News, Media News, Ed Tech Products, and Professional Literature Reviews. Timely and pertinent

columns authored by leaders in research and application of educational technology are included in each issue.

ETC — Educational Technology and Communication. Subscription Department, Far West Laboratory, 1855 Folsom Street, San Francisco, CA 94103. Published monthly — 12 issues $36.00.

Far West Laboratory for Educational Research and Development has begun a monthly publication entitled *ETC – Educational Technology and Communication*. According to FWL, "ETC will keep you abreast of developments in technology and their applications in education, heighten your computer awareness, and serve as a forum for the discussion of issues and problems confronting school board members and administrators."

Infoworld. Popular Computing, Inc. 375 Cochituate Road, Box 880, Framingham, MA 01701. Published weekly — 51 issues $25.00. (617) 879-0770.

Infoworld is an easy-to-read newsprint magazine for all microcomputer users. It supplies weekly news coverage of domestic as well as international computer corporations, innovations and technology; it includes editorials, software and hardware reviews and news, a rapid access Marketplace, and classified advertisments. *Infoworld* is an informative and fun publication for anyone interested in computer technology.

Learning Magazine. Subscription Department, 1255 Portland Place, Boulder, CO 80321. Published monthly — 9 issues/$12.00.

Learning's October issue focuses on computers in the schools, what their effects are and how to get the computer into your school by raising funds to implement the program. Also addressed is what effects computers in the school will have on you, the teacher. Featured in each issue is a section entitled "High Tech Teaching" which addresses computers and other electronic aids.

Microcomputing. P.O. Box 316, Dalton, MA 01226-0316. Published monthly — 12 issues $25.00. (603) 924-9471.

Oriented toward the microcomputing public, this magazine provides updates on computing technologies, IBM, Apple, Atari, and other high tech corporations, as well as suggestions and articles to provide the user with an understanding of the world and resources of microcomputing today.

Personal Computing. P.O. Box 2941, Boulder, CO 80231. Published monthly — 12 issues $24.00.

This magazine is geared toward the public who have or wish to incorporate microcomputers into their business or personal lives. *Personal Computing* does have an education section, but the main objective of the magazine is to introduce new technologies, ideas, and products to the general population.

Popular Computing. Subscription Department, P.O. Box 307, Martinsville, NJ 08836. Published monthly — 12 issues $12.97.

This magazine provides in-depth articles on computer products, trends, uses and applications. *Popular Computing* also features book reviews, hardware and software reviews, and a reader service.

Technological Horizons in Education (T.H.E.) Journal. Reader Service Department, P.O. Box 992, Acton, MA 01720. Published bi-monthly — 6 issues $15.00.

T.H.E. Journal is intended to inform educators of the potential abilities and uses of technology and computers in education today. This journal explores new concepts and techniques in education, and is an important resource for anyone involved in technological education.

Wisconsin Center for Educational Research News. Fall-Winter 1982, 1025 W. Johnson St., Madison, WI 53706. (newsletter).

"Special coverage of Micro-computers: New Wave in School Practice and Educational Research." The Fall-Winter, 1982 issue of the *Wisconsin Center for Educational Research News* covers the following topics: teaching students who experience handicaps, Microcomputer Math, and software designed to teach young children speaking and listening skills.

Documents

An Introduction to Microcomputers in Education. 1982. Prepared by Exceptional Child Center, Utah State University, Logan, UT.

This manual was prepared for an inservice training workshop for educators. Articles include: "Microcomputers In Perspective," by Alan Hofmeister (October, 1982, *Exceptional Child*). "Can the Computer Assist in Data Base Management? The Who, What, Where, and How for School Administrators," by Robert Judd (*Educational Computer Magazine*, Jan.-Feb. 1982). "Processing in the Classroom," by Dorothy Judd (*Educational Computer Magazine*, May-June 1982).

People and Computers: Who Teaches Whom? 1980. Education Development Center, Inc. 55 Chapel Street, Newton, MA 02160.

This document explores and analyzes technological education in our schools today. It is particularly concerned with addressing the pedagogic dilemmas that the computer inevitably initiates both socially and educationally.

Technology in Science Education: The Next Ten Years. Perspectives and Recommendations. National Science Foundation, 1979. Division of Science Education Development and Research.

This report was prepared as part of the consideration of current and possible future activities in science education. Papers are presented by: Dr. J. C. R. Licklider, "Impact of Information Technology on Education In Science And Technology"; Dr. John S. Brown, "Fundamental Research in Technology In Science Education"; Dr. Arthur Luehrmann, "Technology In Science Education"; and Dr. Joseph Lipson, "Technology Program Recommendations".

Articles

Braun, Ludwig. **Computers in Learning Environments — An Imperative for the 1980's.** April 1980. Dept. of Technology and Society, State University of New York at Stony Brook, Stony Brook, NY 11794.

Braun's article discusses the importance of the immediate and dramatic interventions that our educational system must make in order to take advantage of the many benefits the computer can contribute, and submits arguments to support that statement. The article recommends a specific course for implementing successful computer education, and recognizes organizations and people who are actively participating in creating a computer literate society.

Edwards, Judith B. **MicroSIFT: Clearing the Way.** Northwest Regional Educational Laboratory, 300 S.W. Sixth Ave., Portland, OR 97204. (503) 248-6800.

This article introduces a clearinghouse for microcomputer software, courseware, and hardware information for schools. The clearinghouse is called MicroSIFT (Microcomputer Software and Information For Teachers) and has established effective dissemination procedures and incorporated into its operation a flexible user support and technical guidance component. A network of organizations developing software is being formed which will provide an efficient way of developing, evaluating, and reviewing microcomputer-based educational materials.

Gagne, Wagner, Rojas. "Planning and Authoring Computer-Assisted Instructiona Lessons." **Educational Technology,** Sept. 1981, pp. 17-26.

This article proposes a system for planning and authoring lessons in Computer-Assisted Instruction (CAI). The authors give strategies in the form of "prescriptions" or directions for the programmer to follow when designing instruction. Six examples are provided which serve as guidelines to assist the reader in developing computer-assisted instructional lessons.

Hade, D. "Literacy in an Information Society." **Educational Technology.** August, 1982, pp. 7-12. Bibliography included.

Hade explores the concept that technology makes it necessary for us to educate beyond traditional print in literacy. He feels our current concept of literacy must be expanded to include literacy in all of the major media of communication: aural literacy, visual literacy, computer literacy, as well as print literacy.

Hatch, O. "Education in a Postindustrial Society." **American Education,** June, 1982, pp. 4-7.

This article provides an insight into how our educational system must bend to fit the changing values associated with the evolution of our "high tech, silicon" world. The Protestant work ethic may no longer be relevant to today's societal and occupational needs.

Luehrmann, A. "Planning for Computer Education — Problems and Opportunities for Administrators." **National Association of Secondary School Principals Bulletin,** April, 1980, pp. 62-69.

The article deals with practical questions surrounding computer education and how administrators can implement effective computer education programs within their schools. Pertinent topics include: who will teach the computer course, what department does it belong in, is curriculum available for teaching computing, and what about maintenance, security, and teacher training?

Molnar, A. R. "The Coming of Computer Literacy: Are We Prepared for It?" **Educational Technology,** Jan. 1981, pp. 26-28.

The article outlines the need for our educational system to reevaluate the value of thinking, as opposed to the value of "physical work," in our society. Molnar stresses the need for computer literacy in an "information" society and details the important role computers play in educational curriculum if education is to have social value.

Molnar, A. R. "The Search for New Intellectual Technologies." **T.H.E. Journal,** Sept., 1982, pp. 104-112.

This article focuses on how an "information society" will greatly affect our current technologies and will demand new "intellectual" technologies to arise. These intellectual technologies will have to "amplify man's learning, analytical, and problem solving power."

Molnar, A. R. "The Next Great Crisis in American Education: Computer Literacy." Published by the National Science Foundation.

Molnar outlines the need for computer literacy in our society to prevent a growing separation between those working with and without it. Therefore, the burden to teach computer literacy is on educators.

Pogrow, S. "Avoiding 'Micro' Pitfalls." **The School Administrator,** July/August, 1982, pp. 12-13.

This article acts as a guide to selecting a microcomputer to fit the needs of your school. Common pitfalls are explained and several "tips" are provided offering unbiased, expert purchasing information.

Roecks, A. L. "How Many Ways Can the Computer Be Used in Education? A Baker's Dozen." **Educational Technology,** Sept., 1981, p. 16.

This article reiterates the 12 uses for computers in education presented by Norman Watts in the April, 1981 edition of *Educational Technology*. In addition to the 12 uses, Roecks suggests a new thirteenth category of computer application — namely, institutional coordination.

Senese, D. J. "Research, Technology, and Cooperation." **American Education,** June, 1982, pp. 14-19.

Senese introduces the Office of Educational Research and Improvement (OERI) of the U.S Department of Education and

its goals, which are designed to improve and strengthen our educational system by assisting states and localities in the areas of technology and excellence in education.

Schneidernan and Griffing. "Instructional Software Development." **The School Administrator,** April, 1982, pp. 14-15.

Deals with the potential problem of duplication of effort and the quality of microcomputing instructional software. This article describes part of Minnesota's approach to solving the problem through the Minnesota Educational Computing Consorium (MECC).

Tursman, C. "Learners as Problem-solvers: Computers In Education." **The School Administrator,** April, 1982, pp. 11-13.

A personal interview with Seymour Papert, a mathmatician and educator who worked with Jean Piaget. In this article, Papert discusses the computer language, LOGO, he and his collegues developed at the Massachusetts Institute of Technology, his work with school districts, and the implications of his learning experiments.

Watts, N. "A Dozen Uses for the Computer in Education." **Educational Technology,** April, 1982, pp. 18-22.

This article looks at the potential value of the computer in education by examining 12 distinct classes of computer use as they relate to school organization, curriculum develoment and instruction.

Wiege, R., Watt, D. "Forum on Educational Computing." **Popular Computing,** Nov., 1982, pp. 132-141.

Six prominent leaders in the field of educational computing are interviewed and express their expectations and appraisals of computers and their potentials for use in the classroom.

Organizations

Conduit — P.O. Box, Iowa City, IA 52244.

Conduit is a source for computer-based instructional materials that are reviewed, well-documented, programmed for ease of transfer, and kept up-to-date. All materials are peer reviewed for conceptual validity, instructional usefulness, and overall quality.

The International Council for Computers in Education, (ICCE) — Dept. 4A, Department of Computer and Information Science, University of Oregon, Eugene OR 97403.

This organization provides a way for educators to further instructional computing. ICCE is dedicated to effective and proper uses of computers in education and publishes a catalog with instructional materials specifically for computer education.

Minnesota Educational Computing Consortium, (MECC) — 2580 Broadway Drive, St. Paul, MN 55113.

The Minnesota Educational Computing Consortium (MECC) is an organization created by the four public educational systems in Minnesota to coordinate and provide computer services to students, teachers and educational administrators throughout the state. MECC draws upon the resources of membe. systems and a professional staff in providing the overall review of computing plans and budgets, a statewide instructional computing network, the development of regionally-based management information systems, and support to a variety of special projects utilizing computers.

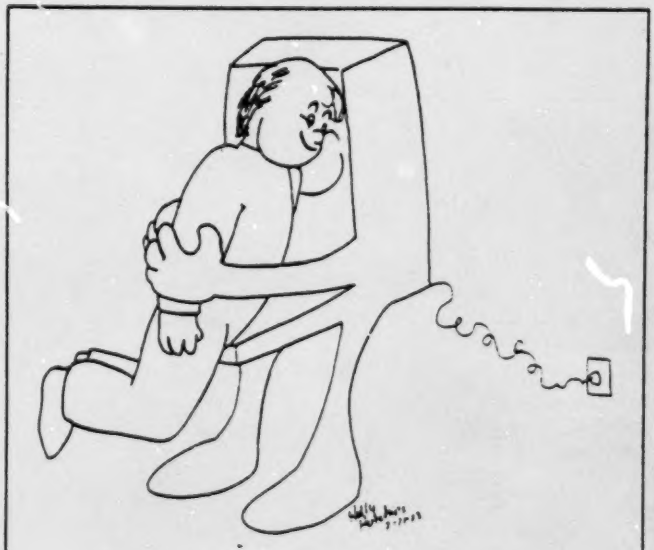
Northwest Regional Education Laboratory (NWREL) — 300 S.W. Sixth Ave. Portland, OR 97204.

The Northwest Regional Education Laboratory provides two major networks of computer information. June 1980 marked the inception of MicroSIFT — a network clearinghouse for microcomputer software information for teachers. In September 1982, NWREL introduced RICE (Resources in Computer Education), a comprehensive data base that provides information on approximately 2,000 microcomputer course- ware items and over 150 producers or developers of course- ware. Ultimately it is NWREL's goal to provide information dealing with:

- Computer Literacy, containing objectives and test items for computer education.
- Project Registration, a list featuring descriptions of school projects in K-12 computer applications.
- Inventory, containing numbers of student stations and other data on installation of hardware in schools.

Technical Education Research Centers (TERC) — 8 Elliot Street, Cambridge, MA 02138 (617) 547-3890.

TERC provides a service called the Computer Resource Center (CRC) for teachers. The center concentrates on microcomputer hardware, software, curricula, technical information to teachers, and has a library of journals, texts, manufacturer's literature, and manuals on topics related to electronics and computers in teaching. ■



Is this what they mean when they say computers are getting "friendlier?"